FCC Reclassification NOI

Economic Impact Assessment

Prepared for: TIA

- Executive Summary
- Cable Business Case
- FTTH Business Case
- Regulatory Impact

This study examines the impact of prospective FCC regulation on future investment in broadband access networks

- The FCC has issued a Notice of Inquiry (NoI), seeking comment on options for the future regulation of broadband Internet services
  - Options include the extension of telephony regulation hitherto not applied to these services
  - New obligations have the potential to increase operator costs and reduce revenues
- Operators considering network investments will generally use a business case model to determine whether new investments are financially viable
  - Projects which are unprofitable or generate insufficient returns will not receive commercial funding
  - Projects which require public funding will require greater subsidy if the economics are impaired
- This study assesses the impact of prospective FCC regulation on two operator investment decisions using high-level financial models
  - A cable operator considering a new cable build
  - A wireline telecom operator considering an FTTH overbuild of its existing territory
- For each investment case we calculate the expected outcome under the current regulatory environment, and examine how that would change should additional obligations be introduced as a result of the NoI
- We evaluate a range of markets to illustrate areas where the economics will be most impacted
- We would expect results to be directionally similar for all new investments in broadband access networks including, for example, FTTC/VDSL deployment

To assess the economic implications of increased regulation we quantified the impact of a subset of potential obligations and applied these to the business case models

- Obligations were grouped into two levels based upon the likelihood of implementation based on input from TIA
  - Potential obligations explicitly considered by the FCC in the NoI
  - Obligations disclaimed by the current FCC chairman but potentially resulting from reclassification
- To illustrate the economic implications of expanded regulation we selected a subset of obligations from each level that could be modeled in a straightforward and transparent manner using high-level assumptions
  - Some were modeled as increasing operator costs, for example in administration and customer care
  - Others impacted revenues, for example retail price regulation or an obligation to resell or unbundle services
- We did not attempt to quantify the impact of every obligation that could arise through reclassification
  - Effects such as increased product development costs, delays in time-to-market for new services, heightened regulatory uncertainty and consequent impact on risk premium were not included
  - As such, the true cost of regulation for industry could be higher than our findings suggest

Our analysis demonstrates that an increased regulatory burden impairs the commercial case for network investment

- Using business case models we calculate the Net Present Value (NPV) of network investments under different regulatory conditions
  - An investment with a positive NPV is profitable while a negative NPV represents a loss above a hurdle rate of return
- In every case, increasing the degree of regulation reduces the NPV of an investment
- Scenarios that are profitable under base case conditions become loss-making when new obligations are added
  - For the cable investment, the value of the investment in our example rural town falls from a positive NPV of $7.2M to a negative NPV of -$11.5M when all obligations were applied
  - For the FTTH deployment in the urban town the NPV falls from $7.4M to negative -$8.6M
- New regulation may therefore constrain investment in network infrastructure
  - The projects represent significant infrastructure investment: cumulative CapEx of $34M in the new cable overbuild and $22M in the FTTH overbuild over 10 years
  - Each model analyses the impact of regulation on two example cities or towns; extending these effects to the nation would suggest substantial negative impacts
- The greatest economic impacts result from obligations to resell or unbundle the network
  - While the resale and unbundle obligations may not be central to the FCC's policy aims, there is a risk that they could be subsequently introduced if reclassification proceeds
  - As such, any future investment would need to factor in the risk of these obligations being brought in, for example by increasing the discount rate in the business case
- Regulatory uncertainty may itself be a sufficient barrier to investment in many cases, and is not quantified in this study

A second consequence of the increased regulatory burden is to increase the required level of any universal service subsidy that could be awarded

- We model network investments in less populated areas where typically there is insufficient end-user revenue to cover the high cost to serve
  - The base case of these investments have negative NPVs, i.e. they are loss making and would not normally attract commercial investment without public subsidy
- Depending on structure of a broadband support mechanism, deployment in some of these areas might benefit from USF support
  - This study does not seek to quantify USF support payments or speculate as to how this may be disbursed
  - However, to make a loss-making network investment attractive, the USF support would need to at least match the negative NPV
- Even if the new regulatory approach would permit USF funding for broadband deployments, our analysis indicates that other aspects of the approach would substantially increase the funding requirement
  - The NPVs of the loss-making scenarios become more negative when additional regulation is imposed e.g. the negative NPV for cable in the rural area scenario increases from -$8.2M to -$15.7M (an increase of 91%)
  - Consequently, reclassification undercuts the business case for deployment, such that substantial support will be needed merely to bring the NPV to the point it was at under the current framework; still more support would be needed to overcome pre-existing deficit and attract investment
  - Of course, many projects - likely including those analyzed here - would not receive any high-cost support even under a proposed new regulatory approach
- In summary, the potential regulations stemming from reclassification may work at cross-purposes with FCC initiatives seeking to target USF funds to rural areas to support new broadband investment
- Reclassification is therefore an economically inefficient means of achieving universal service goals

The FCC is seeking comment on options for the future regulation of Broadband Internet Services; three options are set out in its Notice of Inquiry

- Maintain the current classification of wired broadband Internet service as a unitary information service
- FCC would rely primarily on its ancillary authority to implement the Commission's broadband policies
- However D.C. Circuit rejected the Commission's theory of ancillary authority in Comcast
- Question therefore as to whether the Commission can accomplish its goals within this framework

- Reclassify broadband Internet connectivity as a telecommunications service subject to Title II provisions
- FCC would hold express authority to implement rules furthering its goals
- Concern that this would result in overregulation of a service that has so far undergone rapid and generally beneficial development
- May therefore not be consistent with Commission goals of promoting innovation and investment in broadband

- Classify wired broadband Internet connectivity as a telecommunications service (as per Option 2)
- Simultaneously forbear from applying most requirements of Title II, other than those required to achieve stated policy goals

The impact of Option 3 is the focus of this study

The NoI positions the "third way" as enabling the FCC to achieve broadband policy goals without subjecting broadband to the full burden of Title II regulation

Source: FCC, CSMG Analysis

We have assessed the economic impact of regulation stemming from Option 3, "the third way"; potential obligations have been categorized in two tiers for analysis

- Classify wired broadband Internet connectivity as a telecommunications service (as per Option 2)
- Simultaneously forbear from applying most requirements of Title II, other than those required to achieve stated policy goals

Note: Likely regulatory actions were identified by TIA analysis – CSMG assessed the economic impacts of these

Assessment of Economic Impact to Operators

Potential Third Way Obligations

- Impact of obligations that the FCC is explicitly considering in the NoI:
  - Introduction of formal complaint process and case-by-case analysis of practices **increases G&A costs**
  - Extension of **USF** adds contribution cost to broadband revenues and creates an opportunity to receive funding for broadband
  - FCC may impose an **obligation to resell** broadband access at regulated rates; causes a share of end-users to be **lost to wholesale** at a reduced revenue

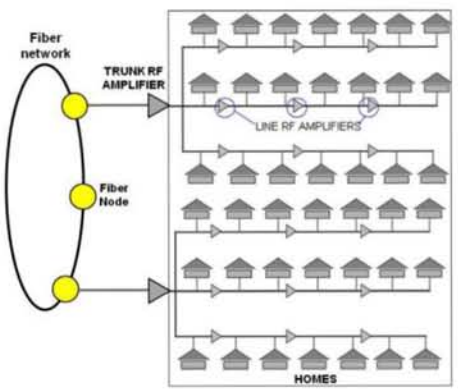
Obligations disclaimed by Chairman

- Further Title II obligations may be imposed over time should forbearance be lifted by FCC or courts
  - **Retail price regulation** reduces operator ARPUs
  - Extension of **Telecommunications Relay Service** (TRS) adds contribution cost to broadband
  - **Network Unbundling** causes share of end-users to be served through wholesale at cost-plus revenue

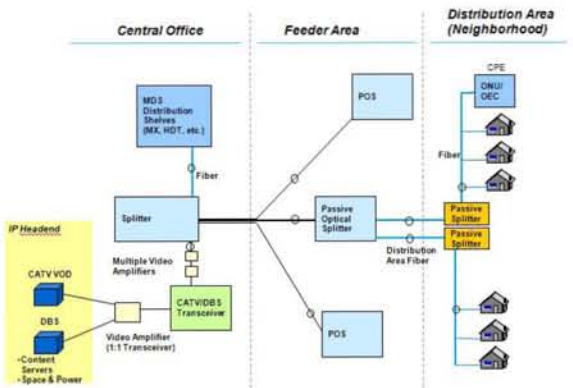
We considered the potential financial impact stemming from the two levels of regulation

Primary Regulations Evaluating	• Formal complaints process • CPNI • "Just and Reasonable" rates, terms and conditions • USF	• Resale at regulated rates	• Retail rate regulation • TRS contribution • Network unbundling
Financial Impact	• Increased admin and support costs – 5% increase to care costs – 5% increase to SG&A costs • USF contribution of $1.40/month (potentially offset by USF support in some limited cases)	• Resale obligations cause 40% of retail subs to be lost to other service providers through • Resold lines are broadband only (no TV and voice) • Wholesale rate is 91% of retail	• Retail rate regulation reduces retail broadband ARPU by 10% • TRS contribution $1.60/quarter • Network unbundling as per resale, but revenue lower at 41% of retail ARPU
Rationale	• Additional costs in complying with regulation and processing claims • USF contribution based on USF fund size staying constant, but with levy now distributed across telephony and broadband lines	• Benchmarked to European wholesale bitstream services (e.g. BT IPstream)	• TRS methodology as per USF • Unbundling impact modeled as "virtual unbundling" – a cost-oriented bitstream access product benchmarked to BT Openreach pricing for NGA services

To understand the effect of the increased regulatory burden CSMG modeled two operator business cases, each looking at a specific investment decision



- Investment case for cable build out
- Triple-play retail services including broadband Internet access
- Hybrid Fiber-Coax architecture with single fiber head-end for service area
- Allocation of central costs for SG&A and customer care



- Investment case to deploy FTTH
- Triple-play retail services including broadband Internet access
- GPON architecture
- Allocation of central costs for SG&A and customer care

For each business, the investment decision is tested in two different market scenarios to examine how the regulation would impact different populations

To examine the impact on investment in cable networks, CSMG modeled a build by an existing cable provider into a new geographic area

- Two markets are considered – a Rural Town and a Rural area
- Markets with geographic profiles similar to those used in our analysis provided as examples

Market: Rural Town

- Population: 72,000 people
- Land area: 120 square miles
- Population density: 600 per square mile
- Example market:
  - Lima, Ohio
  - Local cable provider monthly offers range from 256 kbps ($29.99) to 5 Mbps ($140)
  - HDTV not available

Market: Rural

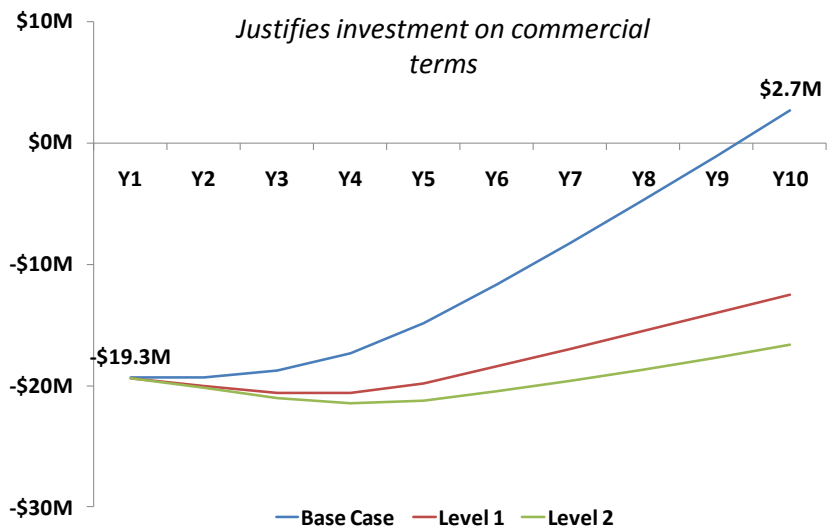
- Population: 24,000 people
- Land area: 400 square miles
- Population density: 60 per square mile
- Example market:
  - Forsythe, Georgia
  - Local cable provider offers up to 1 Mbps internet access for $40
  - HDTV not available

HFC Cable Overbuild Model

- Assumed to be extension by existing operator into new geographic area
- 10 year cash-flow model
- Investment case for cable build out
- Triple-play retail services including broadband Internet access
- Hybrid Fiber-Coax architecture with single fiber head-end for service area
- Expansion limited to a single market
- Only consumer market considered; business not modeled
- Allocation of central costs for SG&A and customer care

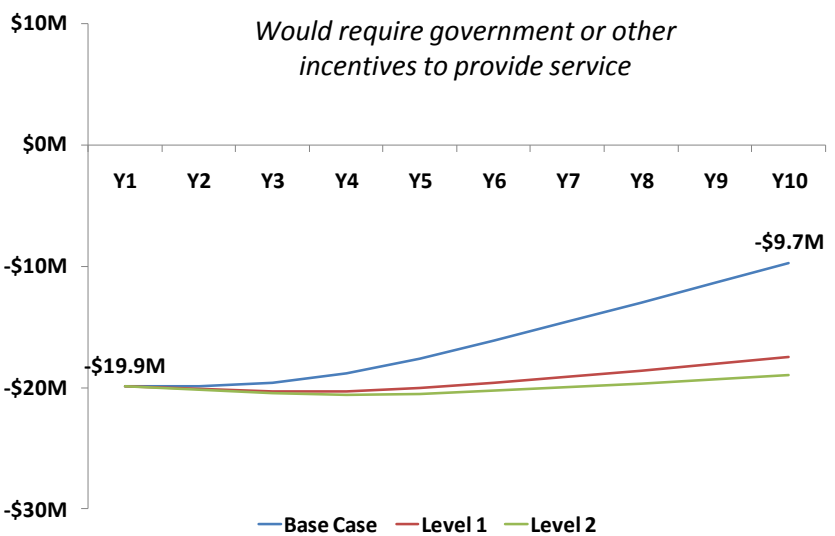
The impact of increased regulation causes the Rural Town cable model to not breakeven; the rural case has greater losses with the obligations imposed

Cumulative FCF: Rural Town Case



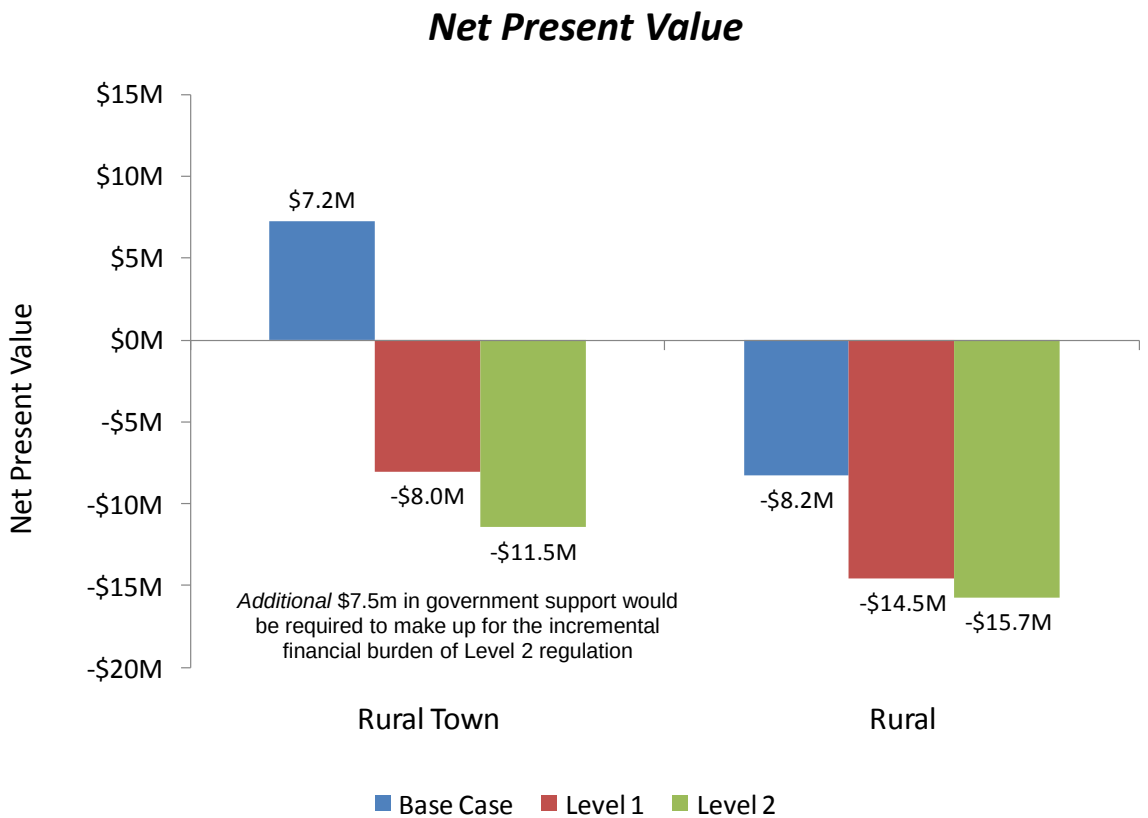
	Cumulative FCF (Year 10, $M)
Base case	2.7
With Level 1 regulation	-12.5
With Level 1 and 2 regulation	-16.7

Cumulative FCF: Rural Case



	Cumulative FCF (Year 10, $M)
Base case	-9.7
With Level 1 regulation	-17.5
With Level 1 and 2 regulation	-19.0

Increasing the regulatory burden significantly reduces the Net Present Value (NPV) of both investment cases



Comments

Rural Town

- The Rural Town business case is profitable in the base case
- However, the NPV with the regulatory impact makes the investment not viable

Rural

- The rural business case is not profitable under any scenario, and would require USF support
- The amount of support needed increases as the regulatory burden grows

For the FTTH investment analysis, CSMG modeled the economics of an ILEC deploying an FTTH network to an area with existing DSL and voice services

- Two cases are considered – an urban market and a rural town market – with population and land area data from the US Census and CSMG's own wirecenter database

Urban Wirecenter Example

- Population: 58,000 people
- Land area: 50 square miles
- Population density: 1,160 per square mile
- Fiber miles: 11.8 miles
- Example market: Galveston, Texas

Rural Town Wirecenter Example

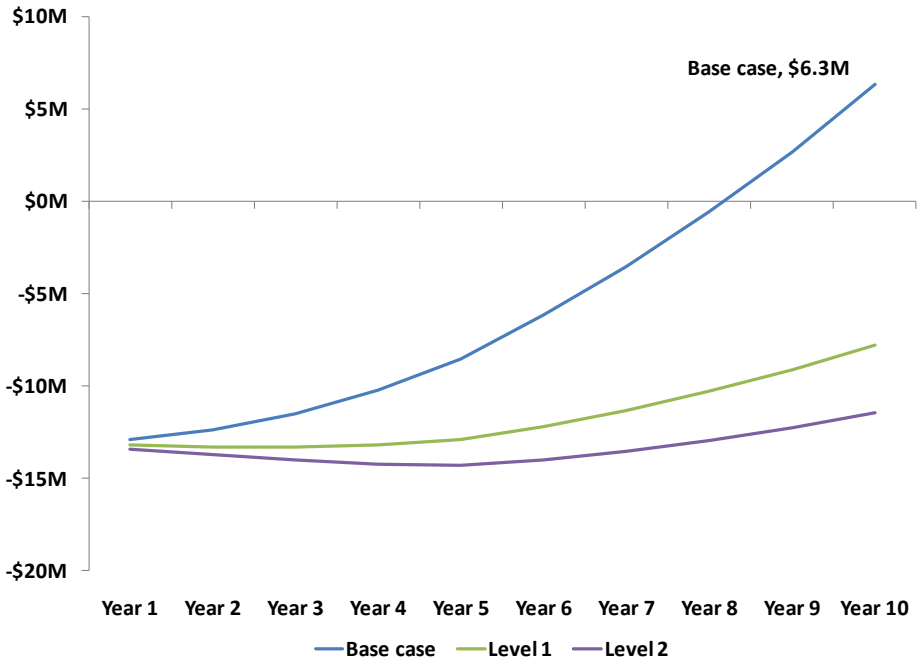
- Population: 29,000 people
- Land area: 111 square miles
- Population density: 260 per square mile
- Fiber miles: 9.6 miles
- Example market: Cedar Valley, Texas

CSMG FTTH Overbuild Model

- Investment case to deploy FTTH in a single CO with existing DSL and telephony service
- 10 year cash flow model
- Triple-play retail services including broadband Internet access
- GPON architecture
- Only incremental revenues and costs of deployment are included

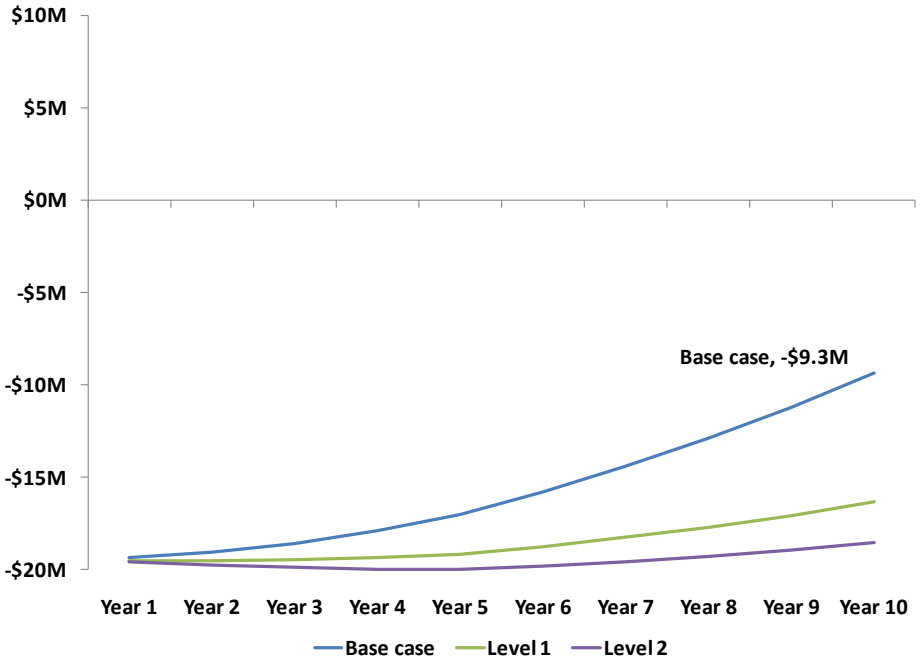
The Level 1 regulatory regime causes the urban FTTH CO to shift from 10 year cash flow positive to negative; the rural town case becomes more loss-making

Cumulative FCF: Urban Case



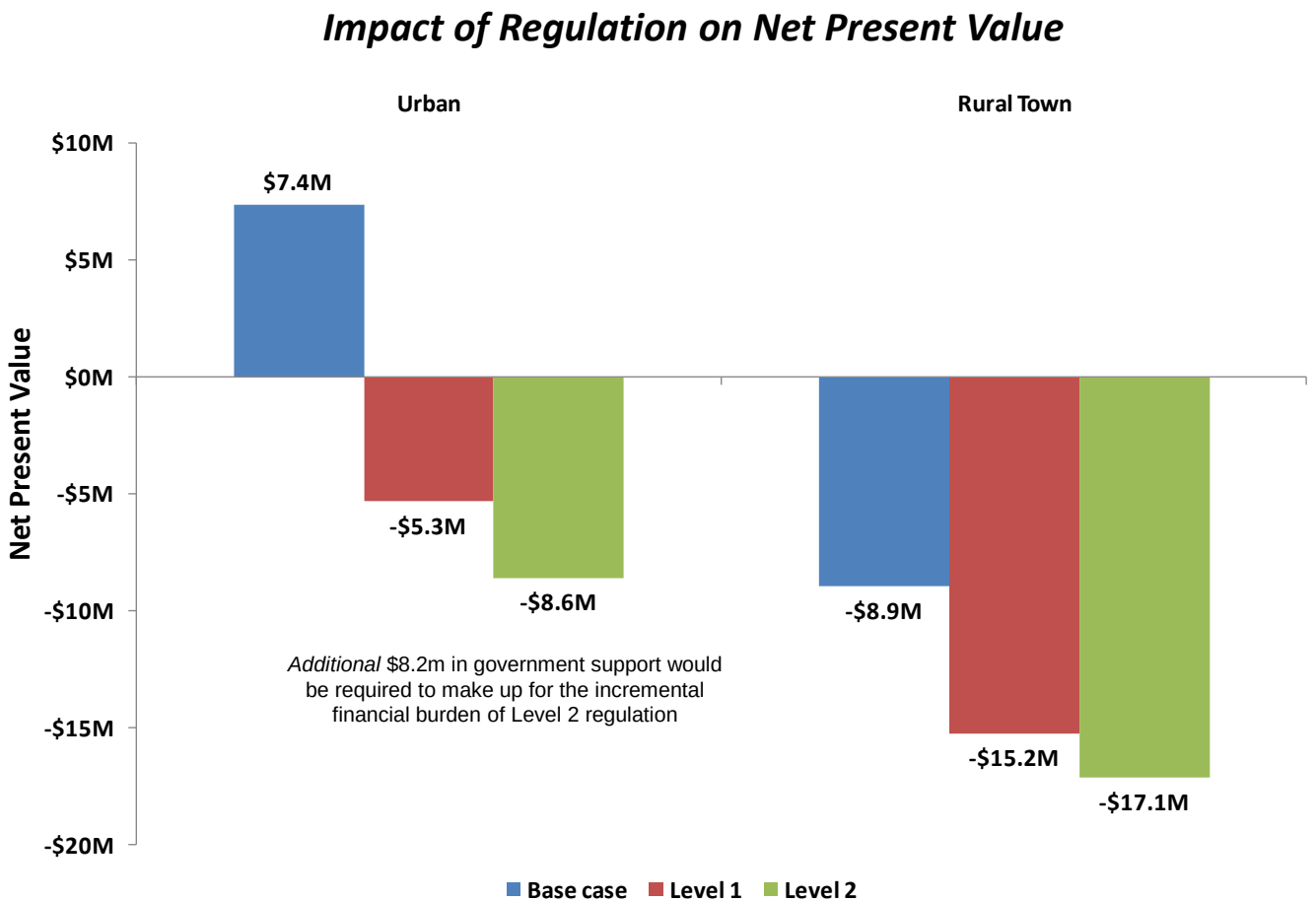
	Cumulative FCF
Base case	$6.3M
With Level 1 regulation	-$7.7M
With Level 1 and 2 regulation	-$11.4M

Cumulative FCF: Rural Town Case



	Cumulative FCF
Base case	-$9.3M
With Level 1 regulation	-$16.3M
With Level 1 and 2 regulation	-$18.5M

Introducing Level 1 regulation causes the urban case to be financially unviable without government subsidies



Comments

Urban

- The combined effect of higher operating expenses and lower revenue from forced resale associated with Level 1 regulation causes NPV to turn negative

Rural Town

- Lower household density necessitates additional CapEx in the form of feeder and distribution fiber and offers fewer subscribers to recoup those costs through additional revenue

- Executive Summary
- Cable Business Case
  - Overview
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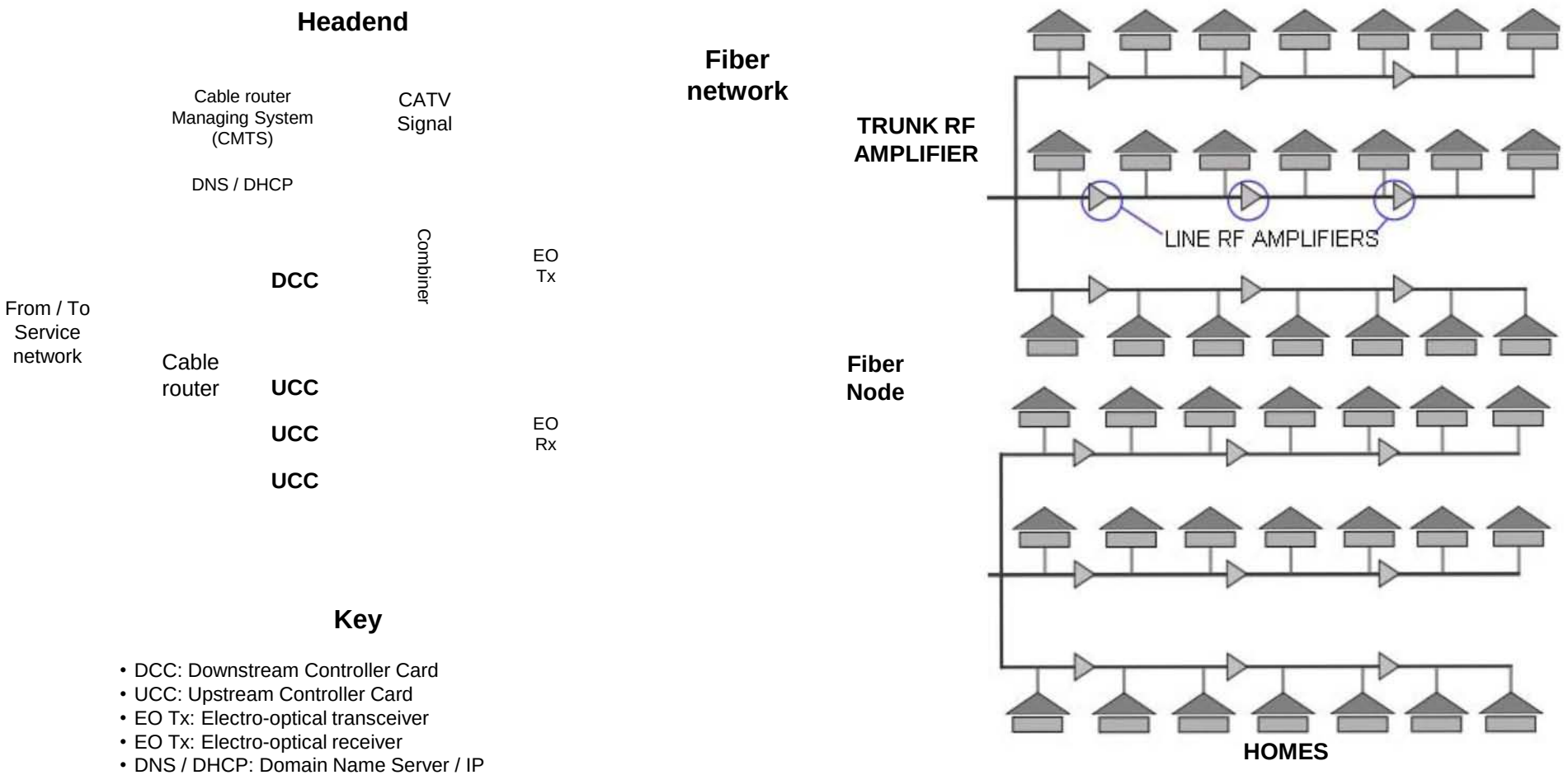
The cable investment case models a Hybrid Fiber-Coax (HFC) network, with single Headend serving the entire coverage area

HFC Network Architecture



Key

- DCC: Downstream Controller Card
- UCC: Upstream Controller Card
- EO Tx: Electro-optical transceiver
- EO Tx: Electro-optical receiver
- DNS / DHCP: Domain Name Server / IP Management

The cable business case models the investment cost and payback of deploying a new HFC cable network in a Rural Town and Rural market

Cable Business Model Overview

Regulatory Scenario

- *Base case (current regulation), Level 1; Levels 1 & 2*
- *Additional Costs; Resale Requirement; Unbundling Requirement*

Demand

Market Scenario

Market Share

Subscriber Forecast

Population

Population Density

Revenue

- *Retail revenues*
- *Wholesale revenues*

Cost of Sales

- *Programming*
- *Direct Costs*

Operational Costs

- *Technical*
- *Marketing*
- *Customer Care*
- *Regulatory Costs*

Investments

- *Head-end*
- *Fiber ring*
- *Node*
- *Drop + Install*
- *CPE*

Fixed ***Variable***

Outputs

Financial Projections

- **Cash Flow**
- **Investment valuation**
  - **NPV**

Finance

EBITDA Multiple
WACC

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Cable Business Case: Demand, Revenue and Financial Inputs

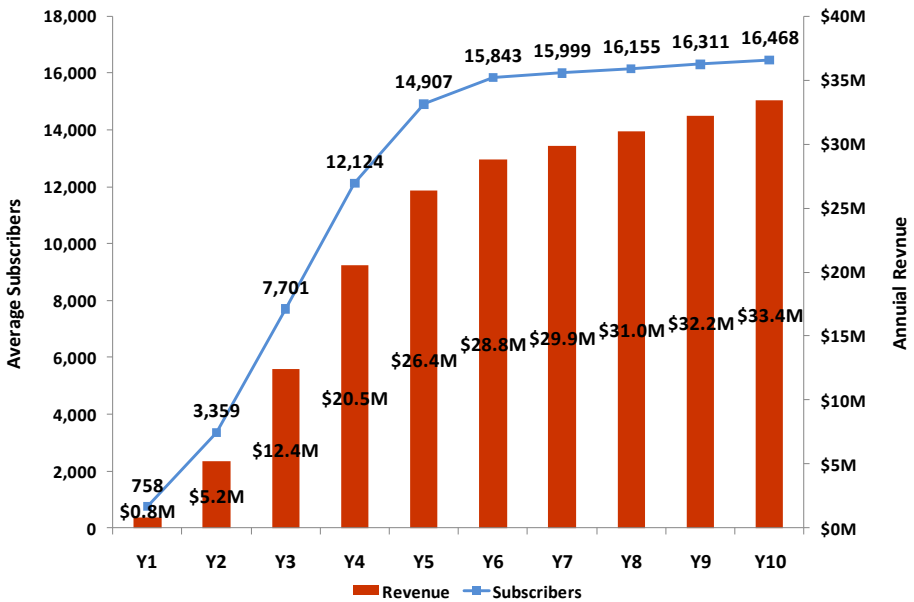
Demand	Rural Town	Rural	Source
Customer Base			
Homes in market	30,000	10,000	CSMG
Final penetration of subscriber served (Broadband)	42%		SNL Kagan, CSMG
Final penetration of subscriber served (Voice)	50% falling to 19%		SNL Kagan, CSMG
Final penetration of subscriber served (Video)	30%		SNL Kagan, CSMG
5 year subscribers reached	15,000	5,000	Calculation
Coverage area (square miles)	120	400	CSMG
Population in market	72,000	24,000	CSMG
Population density (pops per square mile)	600	60	CSMG
Churn	2% per month		JP Morgan, CSMG

Revenue	Rural Town	Rural	
Retail ARPU			
Broadband revenue per subscriber	$33; CAGR: 0.3%		SNL Kagan, CSMG
Voice revenue per subscriber	$41; CAGR: -2.5%		SNL Kagan, CSMG
Video revenue per subscriber	$76; CAGR: 2.2%		SNL Kagan, CSMG

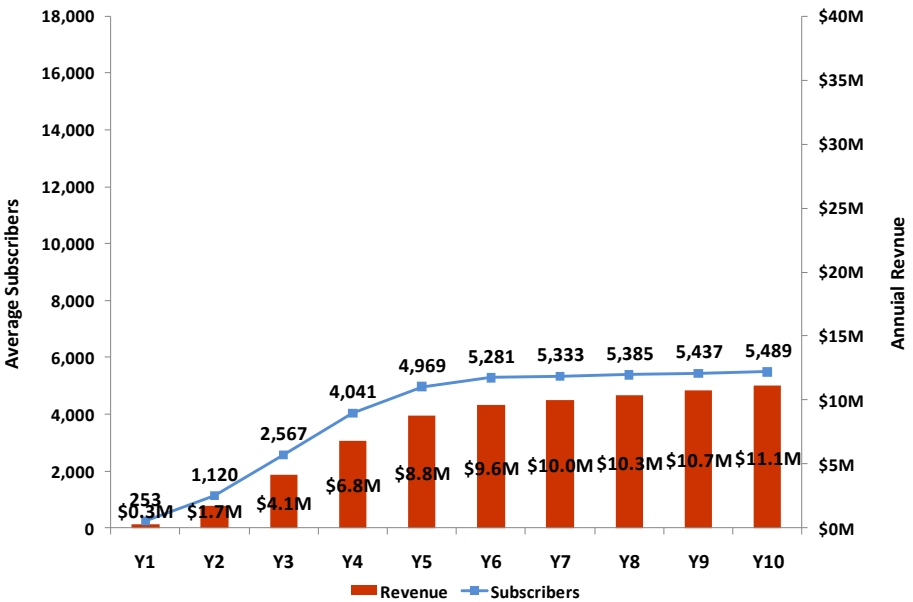
Note: Each cable ARPU is assumed to be 10% lower than the respective FTTH ARPU

Revenues closely track subscriber numbers; a small increase in blended ARPU is expected over 10 years

Subscribers and Revenue: Rural Town Case



Subscribers and Revenue: Rural Case



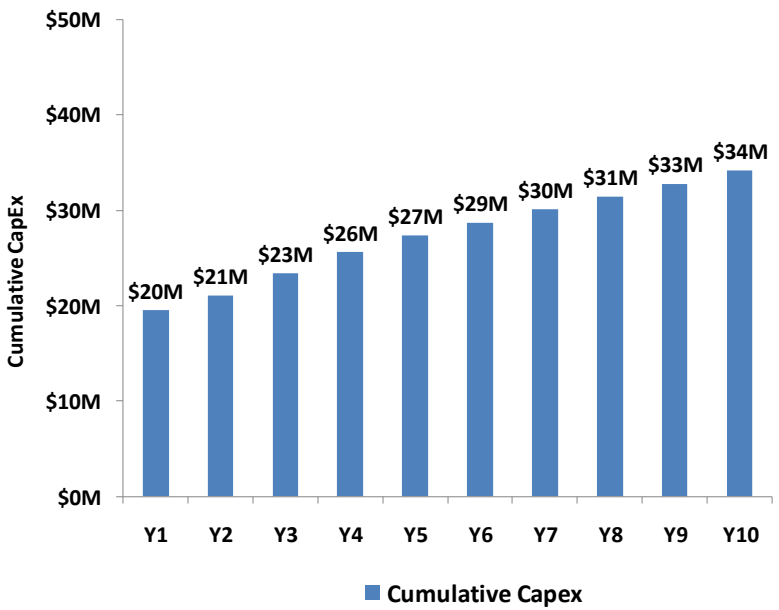
- The demand curve assumes a slower initial ramp, followed by more rapid adoption in the middle phase, tapering off from years 5-10

Cable Business Case: Key CapEx Inputs

CAPEX		Rural Town	Rural	Source
Fixed				
Head-end		$3.3M	$3.3M	Bread, CSMG
Semi-variable				
Fiber	Fiber length (miles)	77	141	Bread, CSMG
	Cost of fiber ($ per foot)	$1.25	$1.25	CSMG
	Cost of digging ($ per foot)	$4.95	$8.95	Bread, CSMG
	Total Fiber Cost	**$2.5M**	**$7.6M**	
Optical Node + Coax	Cable length (miles)	300	540	Bread, CSMG
	Cost of commercial coax ($ per foot)	$2.00	$2.00	JW Hardy, CSMG
	Node Equipment Cost	$30K	$30K	Bread, CSMG
	Nodes required	60	20	Bread, CSMG
	Total Optical Node + Coax Cost	**$11M**	**$26M**	
Fully variable				
Drop and Installation (per home connected)		$240	$240	Bread, CSMG
CPE (per home connected)		$120	$120	Pace Micro (IMS Research, 2008), CSMG

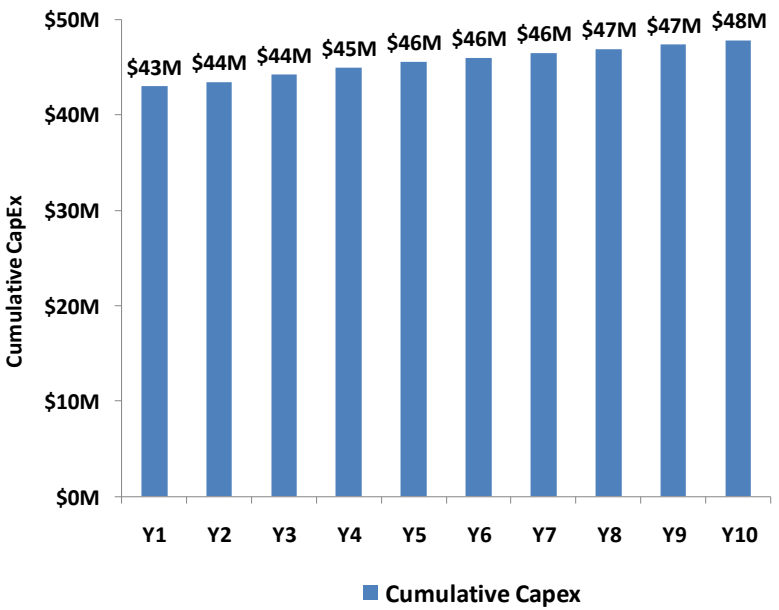
Cumulative CapEx is higher in the Rural case due to the greater distances involved

Cumulative CapEx: Rural Town Case



- 60 nodes required
- 250 subscribers per node
- After non-variable CapEx costs in Year 1, CapEx is driven by subscriber connections

Cumulative CapEx: Rural Case



- 20 nodes required
- 250 subscribers per node
- The rural model has fewer subscribers, so requires fewer nodes, but the route miles and hence construction costs are increased

Cable Business Case: Key OpEx Inputs

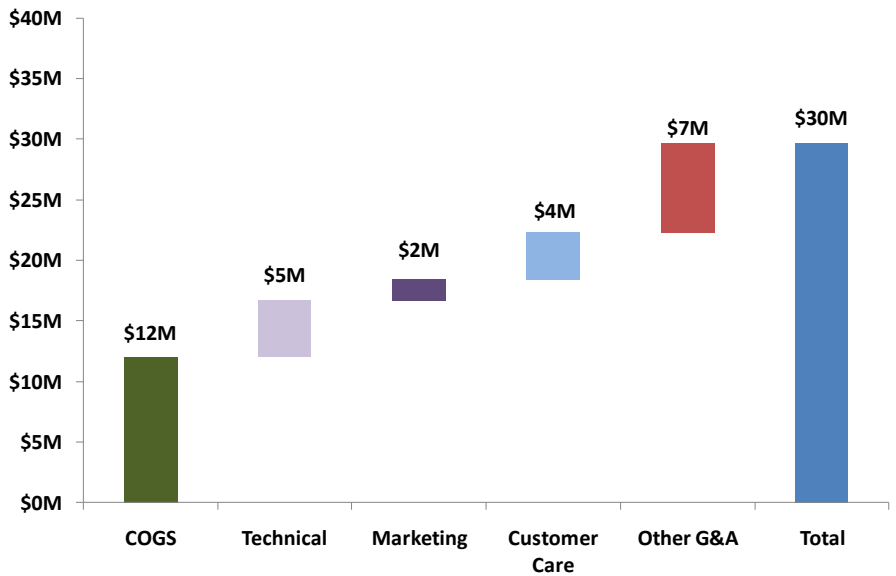
COGS	Rural Town	Rural	Source
Cost as a percentage of revenue			
Programming Costs	23%		Morgan Stanley, CSMG
Direct Costs	4%		Morgan Stanley, CSMG

OPEX	Rural Town	Rural	Source
Cost as a percentage of revenue			
Marketing Costs	4%		Morgan Stanley, CSMG
Gen and Admin Costs	17%		Morgan Stanley, CSMG
Costs driven by subscriber numbers			
Technical Costs ($ / sub / month)	$10.09		Morgan Stanley, CSMG
Customer Service Costs)$ / sub / month)	$8.42		Morgan Stanley, CSMG

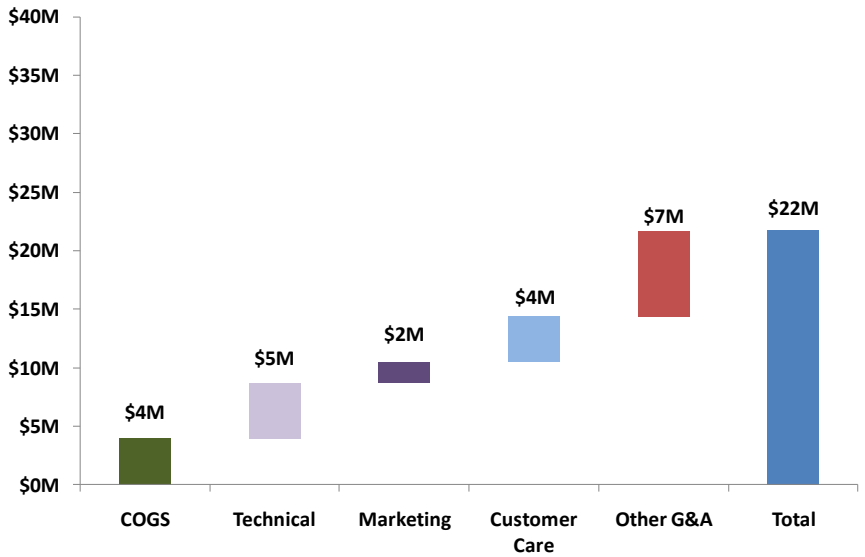
- Unit operational costs assumptions are consistent across the Rural Town and Rural deployments
- However, operational costs are driven by subscriber numbers and revenues, and so are higher in absolute terms in the Rural Town deployment

OpEx is lower in the Rural case due to the lower number of subscribers; cost of goods sold is the largest expense

Cumulative 10 Year OpEx: Rural Town Case



Cumulative 10 Year OpEx : Rural Case



- COGS principally comprises programming
- Technical costs are network operating costs
- Marketing costs are 4% of in year revenue, and include above the line and below the line marketing
- Customer care includes the full cost of care for retail and wholesale subs (when applicable)
- Other G&A is calculated at 16% of revenue and includes administrative functions, property lease costs, etc.

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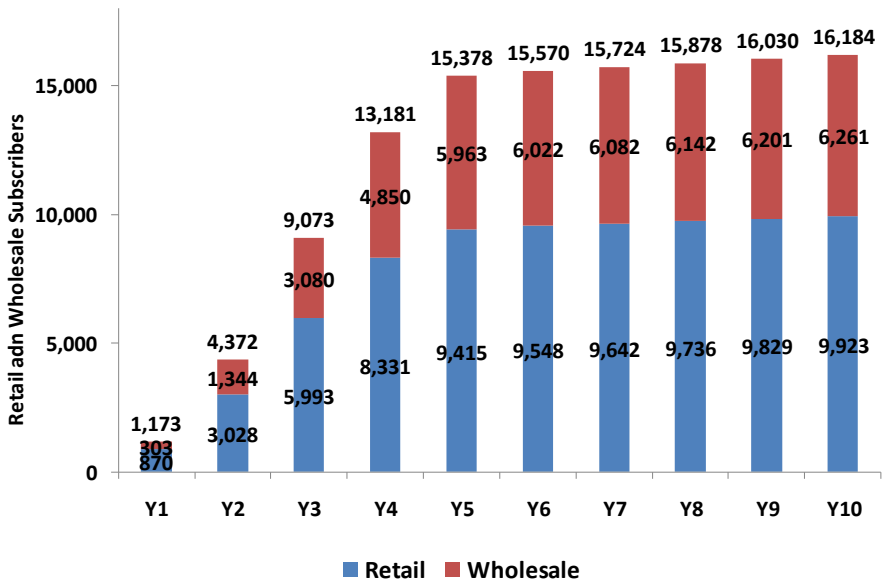
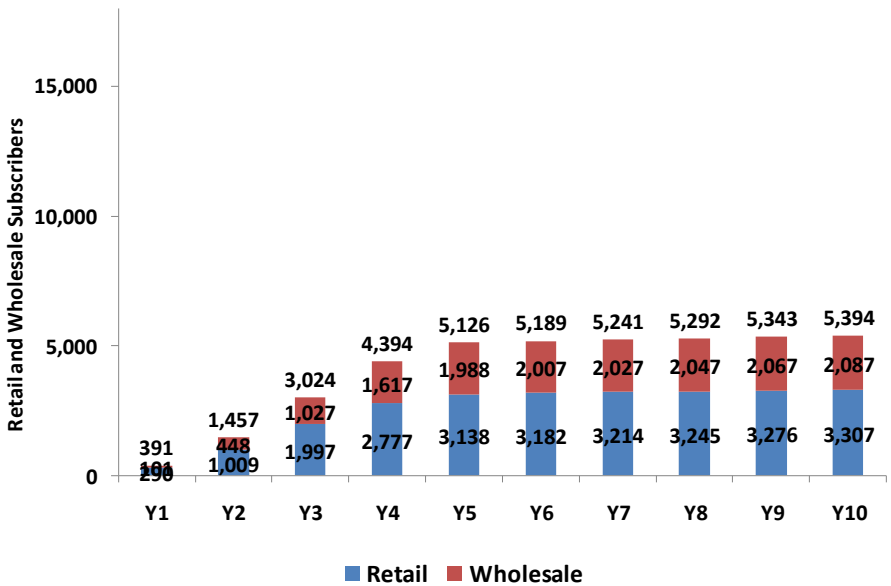
Under resale and unbundling obligations, we assume 40% of cable subscribers are served via wholesale

Subscribers: Rural Town Case with Regulation



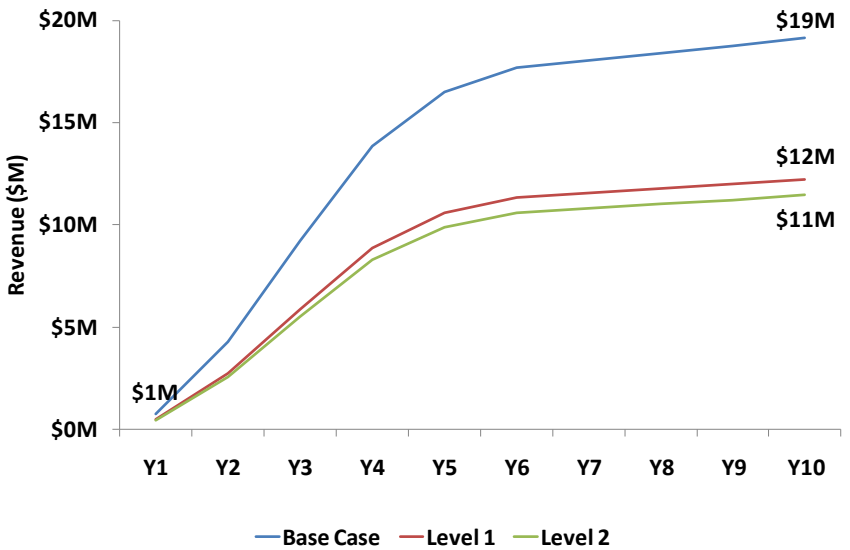
Subscribers: Rural Case with Regulation



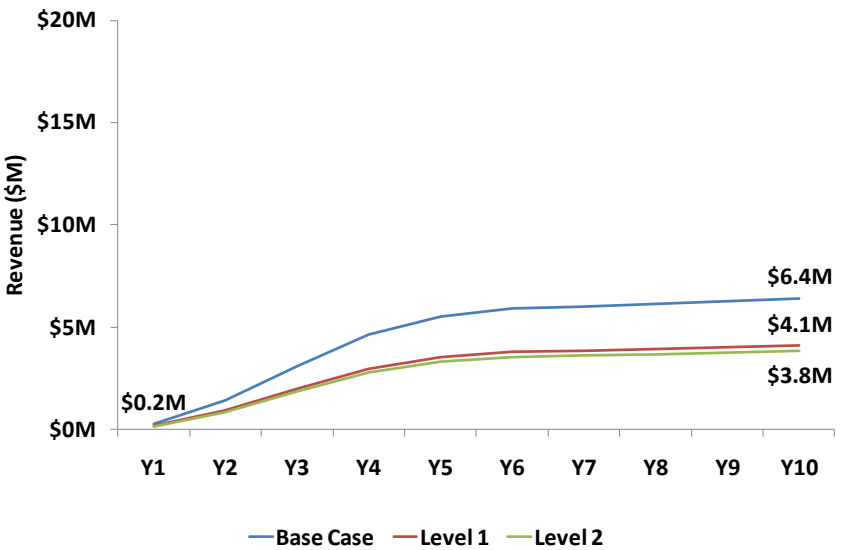
- Obligations in level 1 and 2 regulation may require MSOs to sell wholesale capacity on their networks
- The total number of subscribers is constant across all cases
  - In the base cases, all subscribers are retail subs
  - Under Level 1 regulation, the 40% are modeled as resale customers
  - Under Level 2 regulation, the 40% are modeled as unbundled customers

Obligations to wholesale network access reduce operator revenues by about one-third

Annual Revenue: Rural Town Case



Annual Revenue: Rural Case



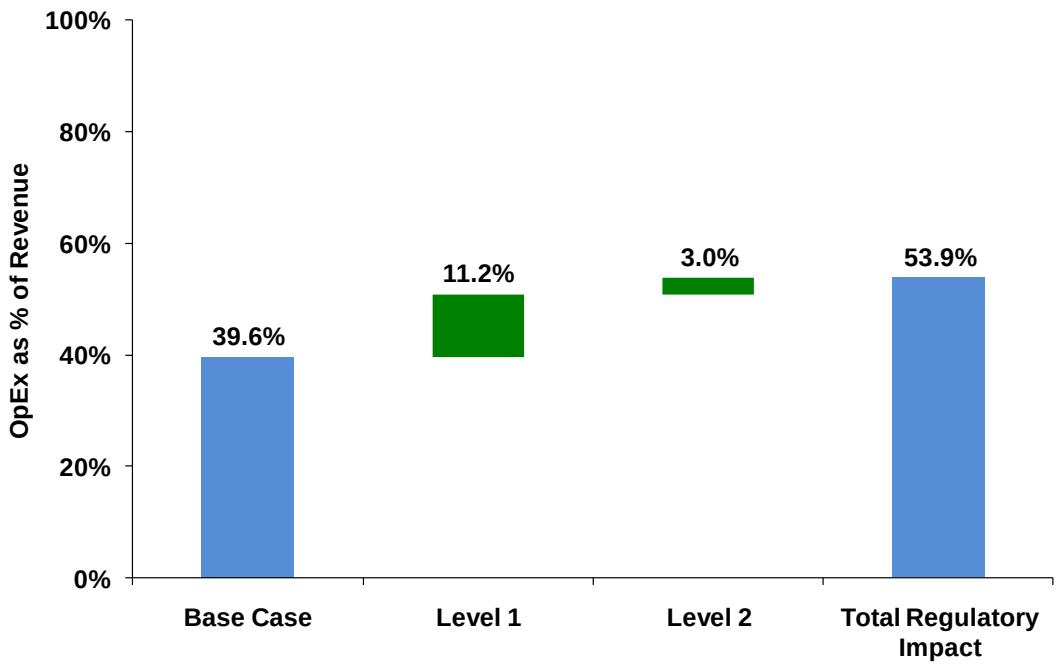
	Year 1	Year 5	Year 10	Cumulative
Level 1 revenue impact	$270K	-$5.9M	-$6.9M	-$49M
Level 2 revenue impact	-$295K	-$6.6M	-$7.7M	-$55M

	Year 1	Year 5	Year 10	Cumulative
	-$90K	-$2.0M	-$2.3M	-$16M
	-$98K	-$2.2M	-$2.6M	-$18M

- Regulated wholesale access reduces average revenue per subscriber from $97 in year 10 of the base case
  - Blended ARPU under Level 1 (resale) falls to $62
  - Blended ARPU under Level 2 (unbundling) is $58

Additional regulation increases OpEx share of revenue by up to 14 percentage points

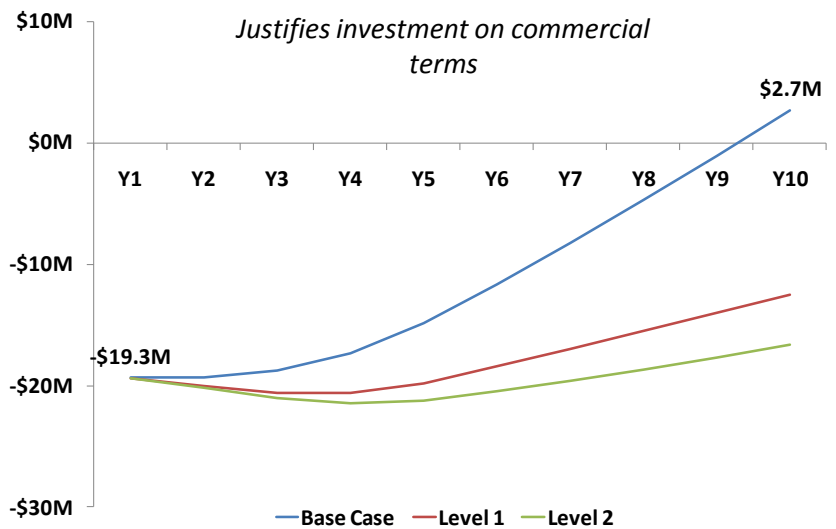
OpEx as a % of Revenue: Rural Town and Rural Cases



- Major components of the OpEx increase include:
  - Increased administrative and customer care costs due to formal complaint process, CPNI obligations, and USF administration
  - USF contribution per sub
  - TRS contribution per sub

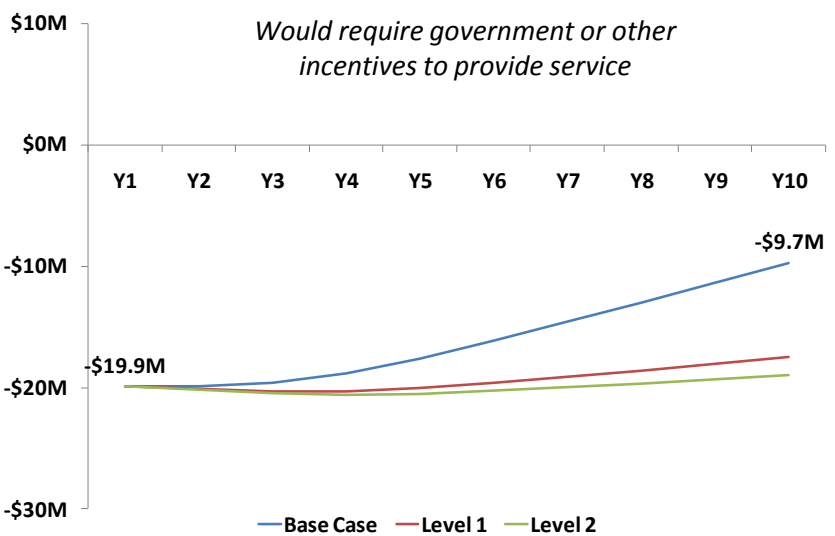
The impact of increased regulation causes the Rural Town cable model to not breakeven; the rural case has greater losses with the obligations imposed

Cumulative FCF: Rural Town Case



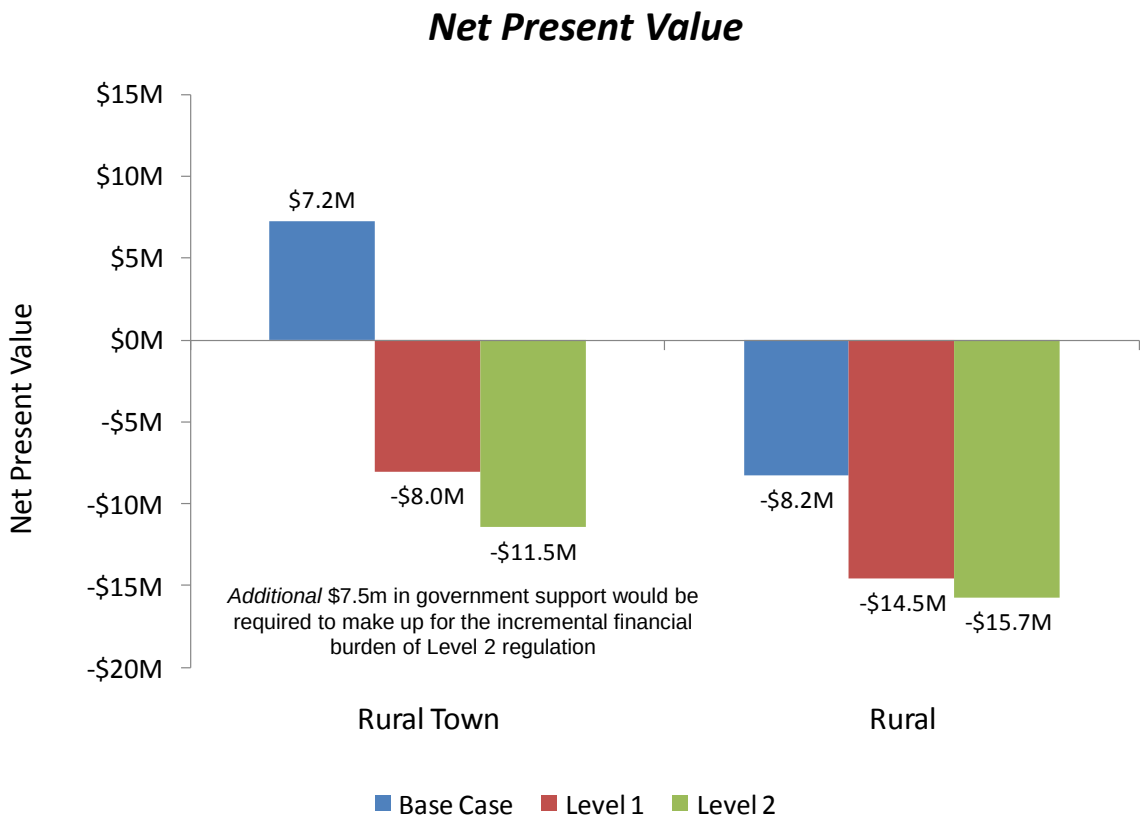
	Cumulative FCF (Year 10, $M)
Base case	2.7
With Level 1 regulation	-12.5
With Level 1 and 2 regulation	-16.7

Cumulative FCF: Rural Case



	Cumulative FCF (Year 10, $M)
Base case	-9.7
With Level 1 regulation	-17.5
With Level 1 and 2 regulation	-19.0

Increasing the regulatory burden significantly reduces the Net Present Value (NPV) of both investment cases



Comments

Rural Town

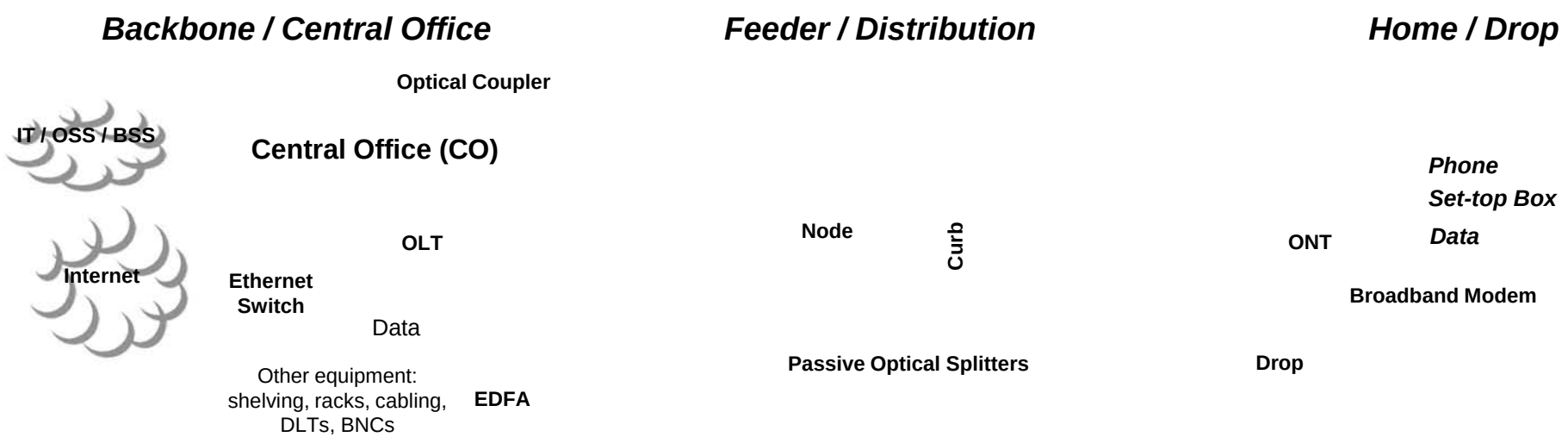
- The Rural Town business case is profitable in the base case
- However, the NPV with the regulatory impact makes the investment not viable

Rural

- The rural business case is not profitable under any scenario, and would require USF support
- The amount of support needed increases as the regulatory burden grows

- Executive Summary
- Cable Business Case
- FTTH Business Case
  - Overview
  - Base case results
  - Regulatory impact
- Regulatory Impact

The FTTH model represents a passive optical network platform providing telephony, video and high speed internet services



COST COMPONENT

Backbone / Central Office
- OLT
- Backbone (allocation)
- CO Labor (installation)
- Other CO Equipment (passive and active components)

Feeder / Distribution
- Feeder and Distribution Fiber Costs
- Feeder and Distribution Fiber Labor Costs
- Passive Optical Components

Home / Drop
- Drop Fiber Cost
- Drop Fiber Installation Cost
- ONT
- Broadband Modem Cost

COSTS VARY BY

Backbone / Central Office
- Homes per CO
- Subscribers per CO
- Labor and equipment cost/efficiency improvement over time

Feeder / Distribution
- Length of feeder and distribution fibers
- Extent of buried vs. aerial plant
- Labor and equipment cost/efficiency improvement over time

Home / Drop
- Length of drop (housing lot size)
- Installation efficiencies
- Labor and equipment cost reductions

We built a ten year revenue, capital and operating cost profile for each CO in order to evaluate the business case for FTTH on a case by case basis

Urban CO
- Area: 50 square miles
- Households: 23,821
- Pop Density: 1,150 per square mile

Rural Town CO
- Area:111 square miles
- Households: 10,189
- Pop Density: 270 per square mile

Revenue
- Voice
- Data
- Video
- Other

CO Characteristics
- Area
- Income
- Density
- Aerial v Underground Plant

Capex
- CO
- Feeder
- DA
- CPE

Opex
- Network Maintenance
- Marketing
- Truck rolls

Business Case Model Engine

NPV per Central Office

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FTTH business case: key revenue and demand assumptions

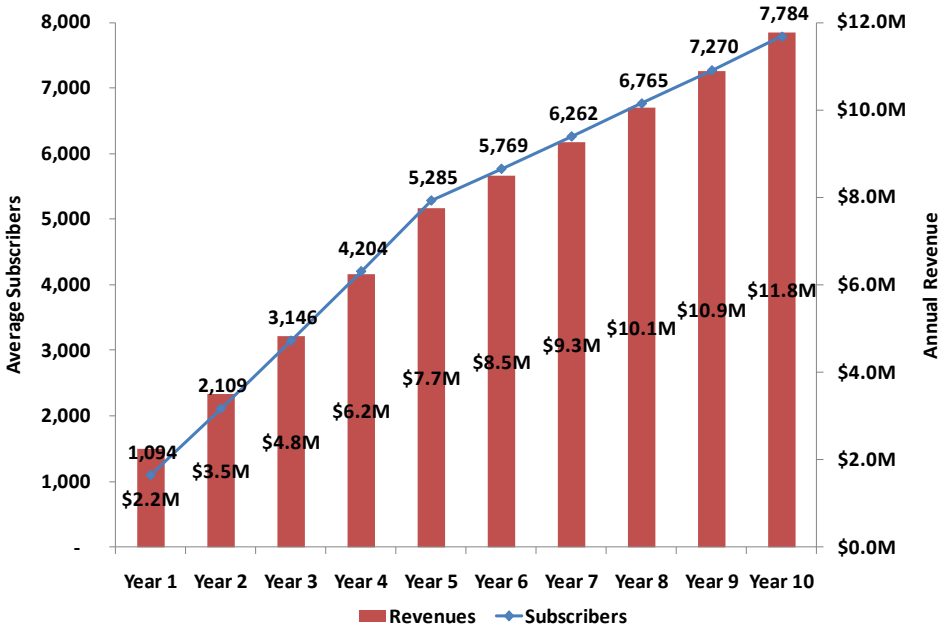
Demand		Source
Household penetration (Per CO)		
Voice services (subs saved through FTTH deployment)	5% of households "saved" moving to 10% "saved" in Y10	CSMG
TV services (market share)[1]	25% in Y5, 35% in Y10	SNL Kagan, CSMG
Broadband services (DSL cannibalization)	33% in Y5; 42% in Y10	SNL Kagan, CSMG

Revenue		Source
ARPU[2]		
Voice ARPU	$45 (2.5% decrease pa)	SNL Kagan, CSMG
TV ARPU	$85 (2.2% increase pa)	SNL Kagan, CSMG
Data ARPU	$37 (0.3% increase pa)	SNL Kagan, CSMG

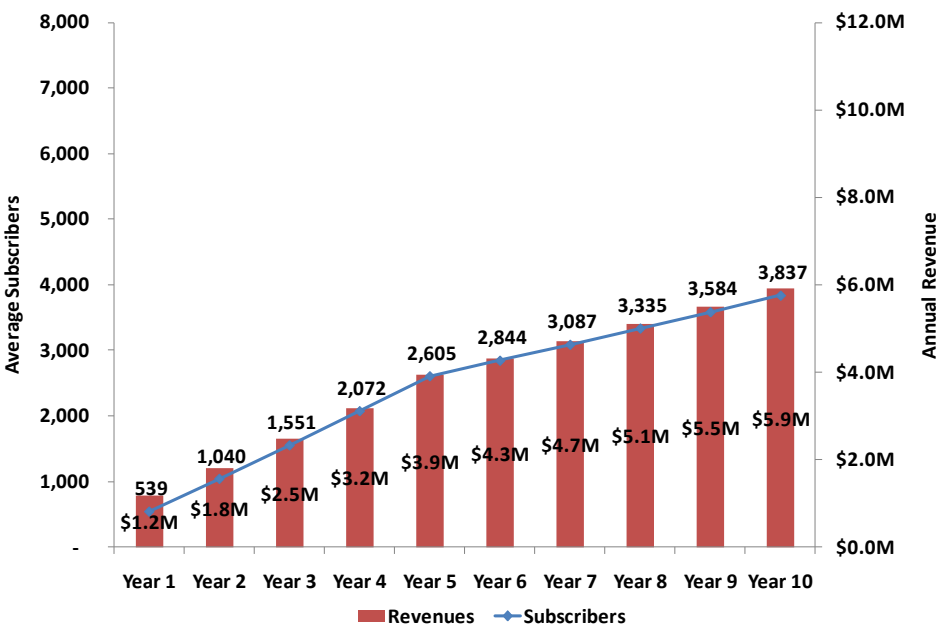
1 Assume that over time FTTH TV gains share from cable
2 Note: Individual service ARPUs are based on service revenue divided by # of RGUs. Because each subscribing HH has > 2 RGUs, blended ARPU is less than the sum of service ARPUs

CSMG calculated the incremental revenue from FTTH over the existing DSL service

Subscribers and Revenue: Urban Case



Subscribers and Revenue: Rural Town Case



- Revenue is incremental based on increased ARPU over DSL ARPU and increased subscribers by preventing share loss to cable providers and incremental coverage of FTTH over DSL
- Incremental revenue of $11.8M per year in urban case and additional 7.8K subscribers
- Implied ARPU of c. $126 per incremental subscriber

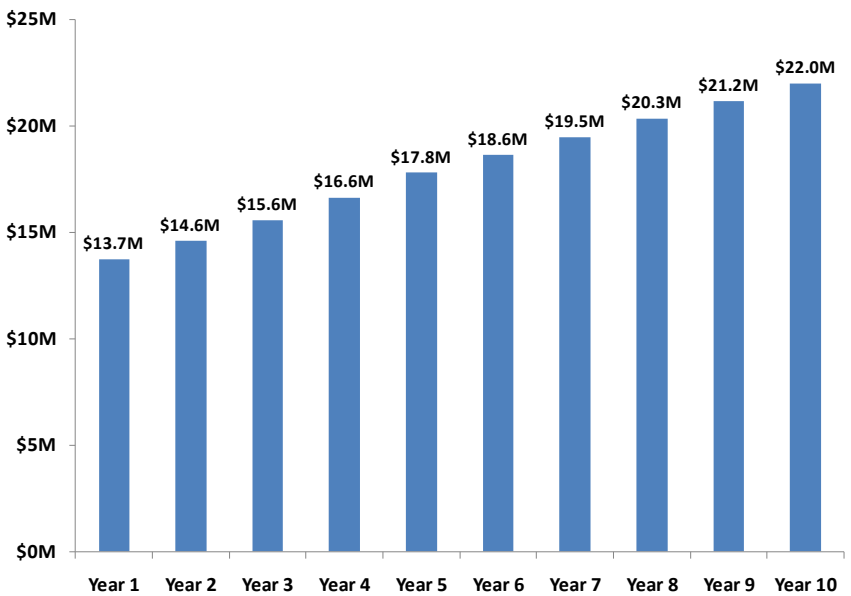
FTTH business case: key CapEx assumptions

	CapEx	Source
Feeder & Distribution Costs		
Cost per foot of fiber, buried	$11	Cook Report, Verizon, Bread, CSMG
Cost per foot of fiber, aerial	$3	Gates Foundation, CSMG
Costs to Pass & Connect		
Cost to Pass, 50th Percentile[1]	$700	CSMG, Verizon, others from 2008 FTTH council papers
Cost to Pass, 50th – 75th Percentiles	$1,300	Industry benchmark
Cost to Connect	~$650	Industry benchmark

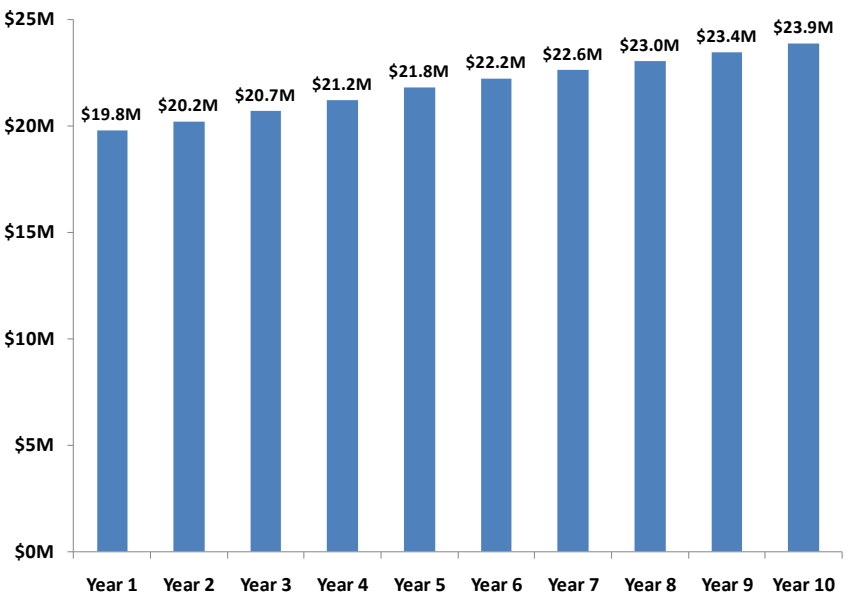
1 Calculated as the weighted average cost to pass the 50% of HHs in the most densely populated CO territories

Higher household density and shorter distances to homes lower CapEx in the urban case

Cumulative CapEx : Urban Case



Cumulative CapEx : Rural Town Case



- CapEx in the urban model is significantly lower due to shorter lengths per household
- 23,821 households
- 2.0M feet of fiber
- $12.4M in feeder and distribution costs

- CapEx is high in the suburban model due to the lower household density
- 10,990 households
- 1.8M feet of fiber
- $18.9M in feeder and distribution costs

FTTH Business Case: Key OpEx Inputs

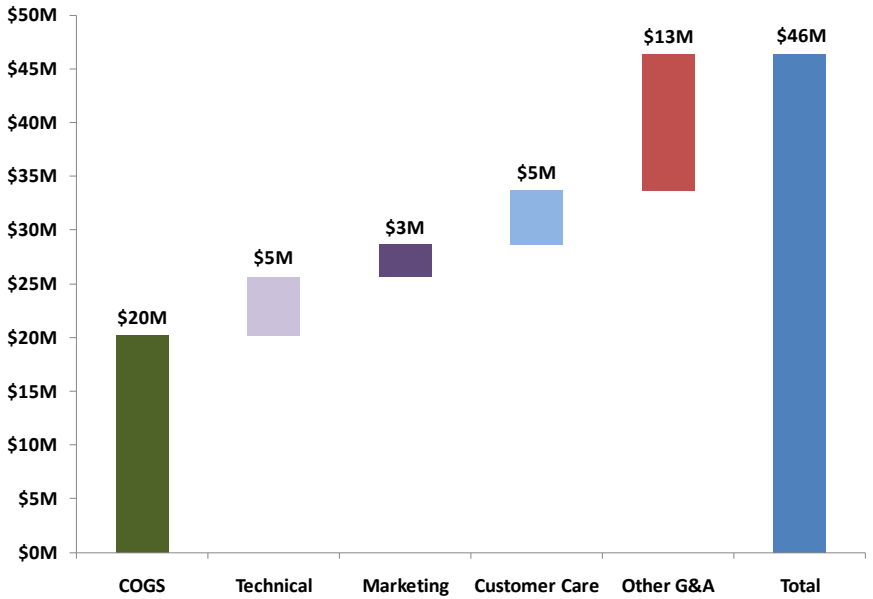
COGS	Urban	Rural Town	Source
Cost as a Percentage of Revenue			
Programming Costs	23%		Morgan Stanley, CSMG
Direct Costs	4%		Morgan Stanley, CSMG

OPEX	Urban	Rural Town	Source
Cost as a Percentage of Revenue			
Marketing Costs	4%		Morgan Stanley, CSMG
Gen and Admin Costs	17%		Morgan Stanley, CSMG
Costs driven by subscriber numbers			
Technical Costs ($ / sub / month)	$9.01 (10% lower than Cable due to infrastructure savings)		Morgan Stanley, CSMG
Customer Service Costs ($ / sub / month)	$8.42		Morgan Stanley, CSMG

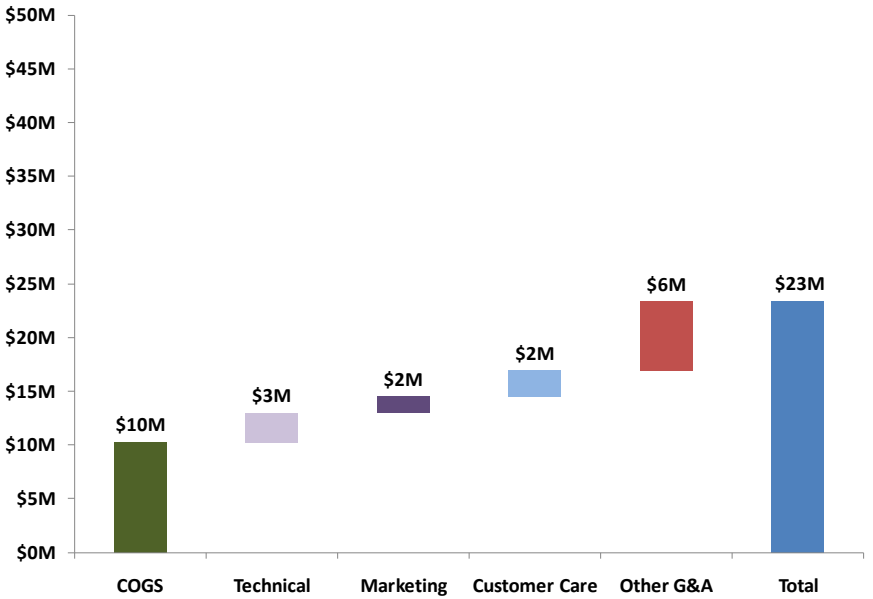
- Utilised the same COGS and OPEX assumptions as in the cable business case
- Unit operational costs assumptions are consistent across the urban and rural town deployments
- However, operational costs are driven by subscriber numbers and revenues, and so are higher in absolute terms in the urban deployment

OpEx is lower in the rural town case due to the lower number of subscribers; cost of goods sold is the largest expense in the urban case driven by programming costs

Cumulative 10 Year OpEx: Urban Case



Cumulative 10 Year OpEx : Rural Town Case



COGS and OPEX are based on cost structure of similar cable businesses, however technical costs are 10% cheaper in the FTTH case than in the cable case as a result of savings from the FTTH architecture

- COGS principally comprises programming, with some other direct costs
- Marketing costs are 4% of in year revenue, and include above the line and below the line marketing
- Customer care includes the full cost of care for retail and wholesale subs (when applicable)
- Other G&A is calculated at 16% of revenue and includes administrative functions, lease costs, etc.

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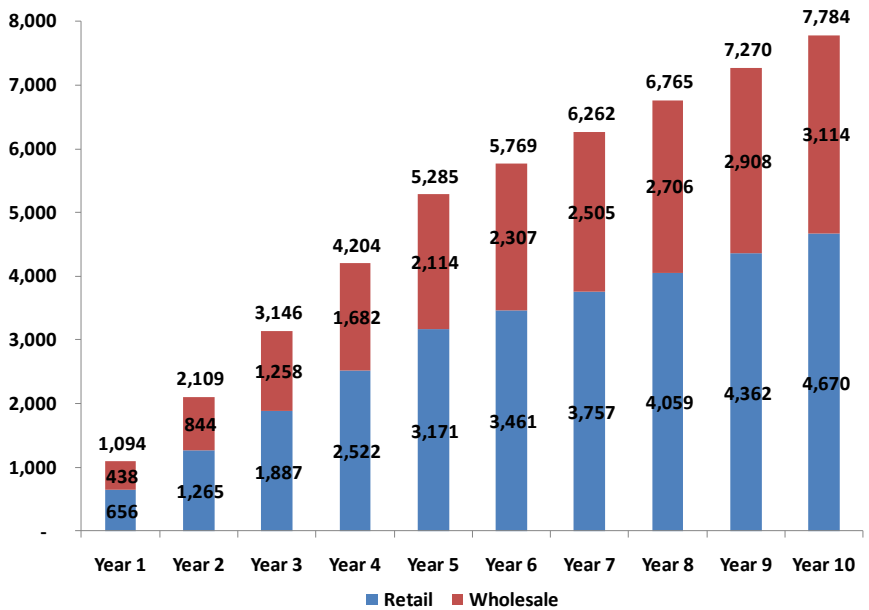
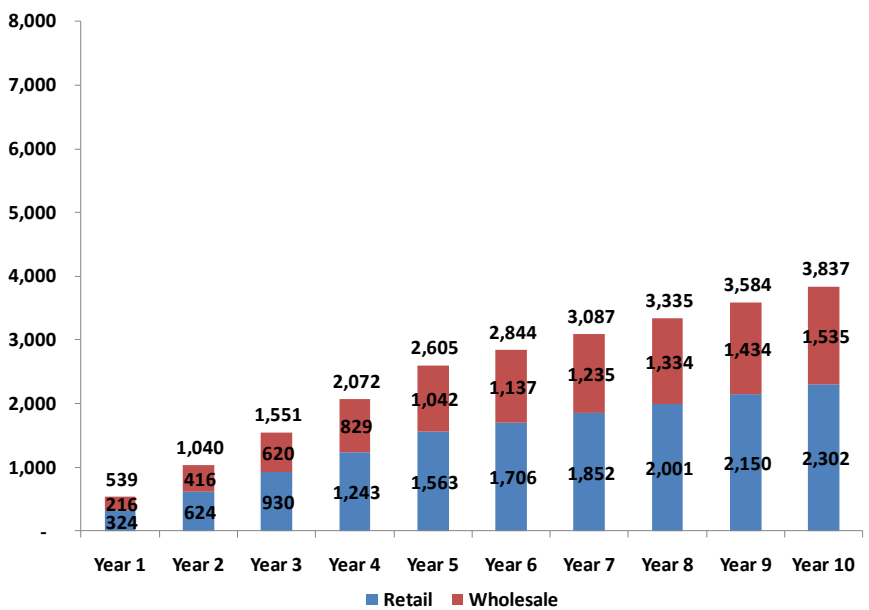
Under resale and unbundling obligations, we assume 40% of FTTH subscribers are served via wholesale

Subscribers: Urban Case with Regulation



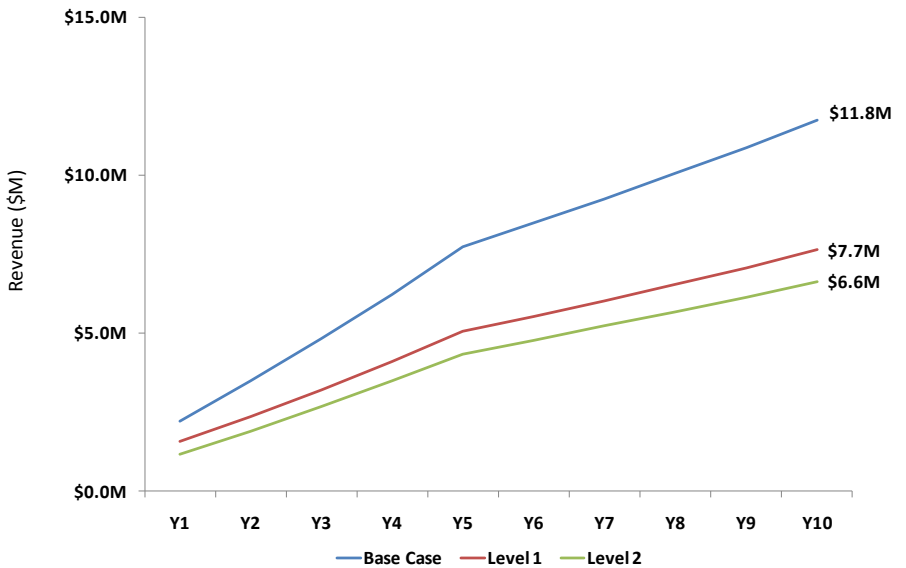
Subscribers: Rural Town Case with Regulation



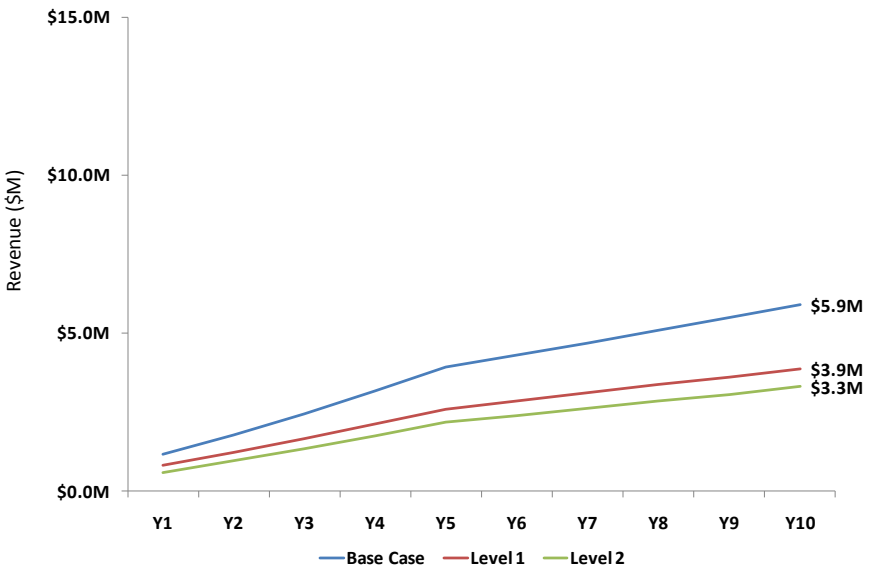
- Obligations in level 1 and 2 regulation may require MSOs to sell wholesale capacity on their networks
- The total number of subscribers is constant across all cases
  - In the base cases, all subscribers are retail subs
  - Under Level 1 regulation, the 40% are modeled as resale customers
  - Under Level 2 regulation, the 40% are modeled as unbundled customers

Obligations to wholesale network access reduce operator revenues by over one-third

Revenue: Urban Case



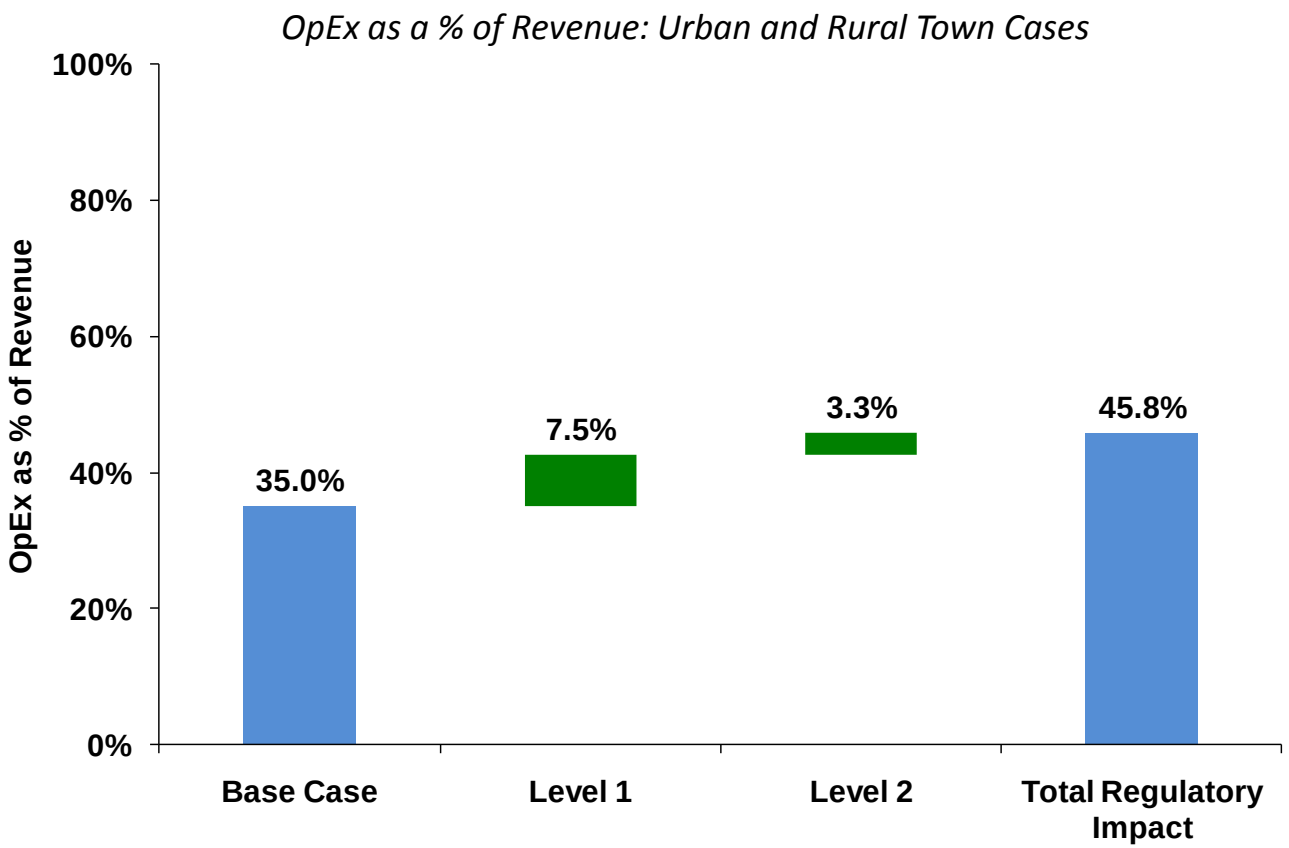
Revenue: Rural Town Case



	Year 1	Year 5	Year 10	Cumulative	Year 1	Year 5	Year 10	Cumulative
Level 1 Revenue impact	-$650K	-$2.7M	-$4.1M	-$26M	-$320K	-$1.3M	-$2.0M	-$13M
Level 2 Revenue impact	-$1.1M	-$3.4M	-$5.1M	-$33M	-$560K	-$1.7M	-$2.6M	-$17M

- Regulated wholesale access reduces average revenue per subscriber from $126 in year 10 of the base case
  - Blended ARPU under Level 1 (resale) falls to $82
  - Blended ARPU under Level 2 (unbundling) is $71

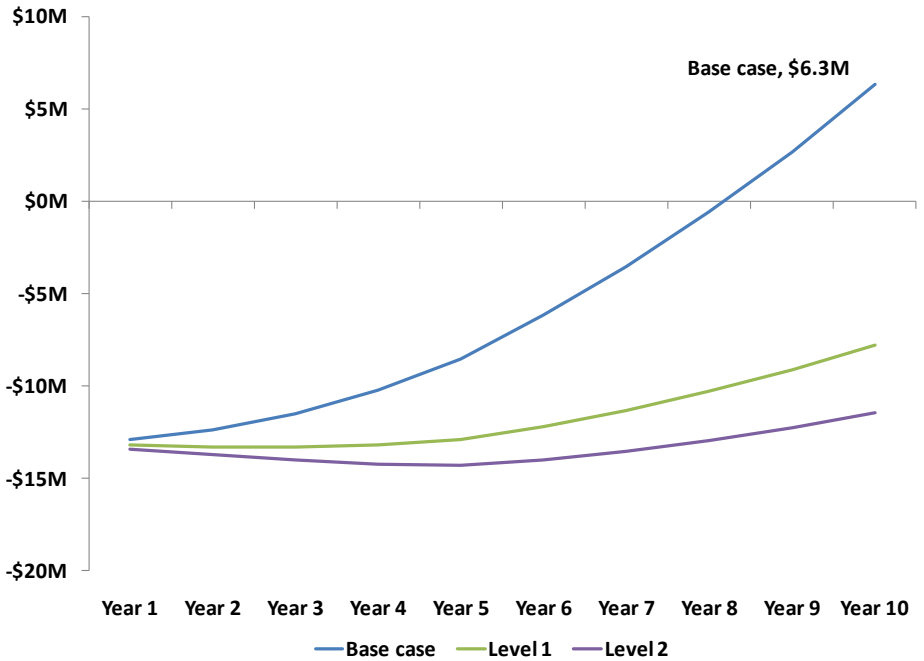
Additional regulation increases OpEx share of revenue by up to 11 percentage points



- Major components of the OpEx increase include:
  - Increased administrative and customer care costs due to formal complaint process, CPNI obligations, and USF administration
  - USF contribution per sub
  - TRS contribution per sub

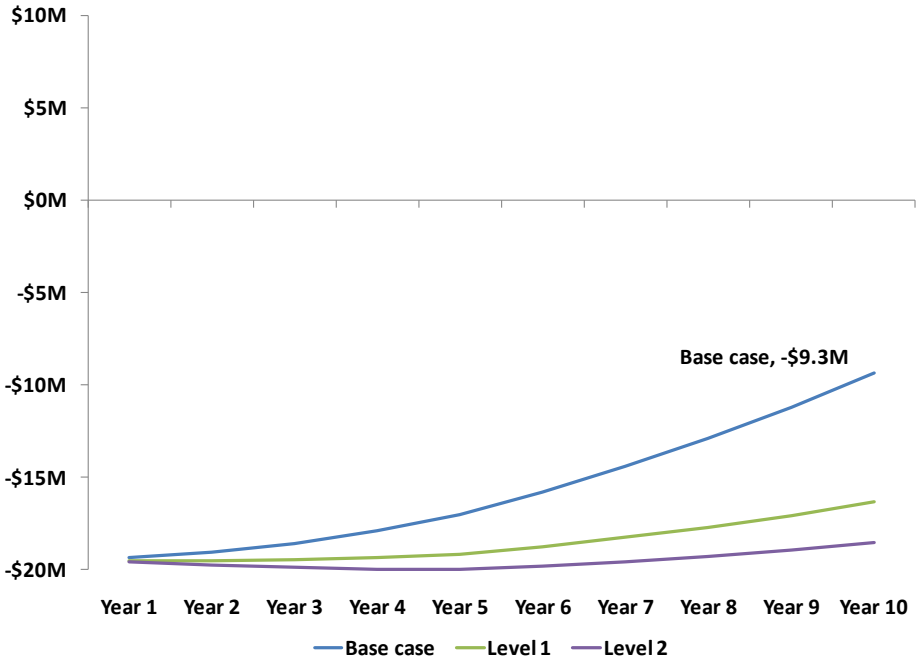
The Level 1 regulatory regime causes the urban FTTH CO to shift from 10 year cash flow positive to negative; the rural town case becomes more loss-making

Cumulative FCF: Urban Case



	Cumulative FCF
Base case	$6.3M
With Level 1 regulation	-$7.7M
With Level 1 and 2 regulation	-$11.4M

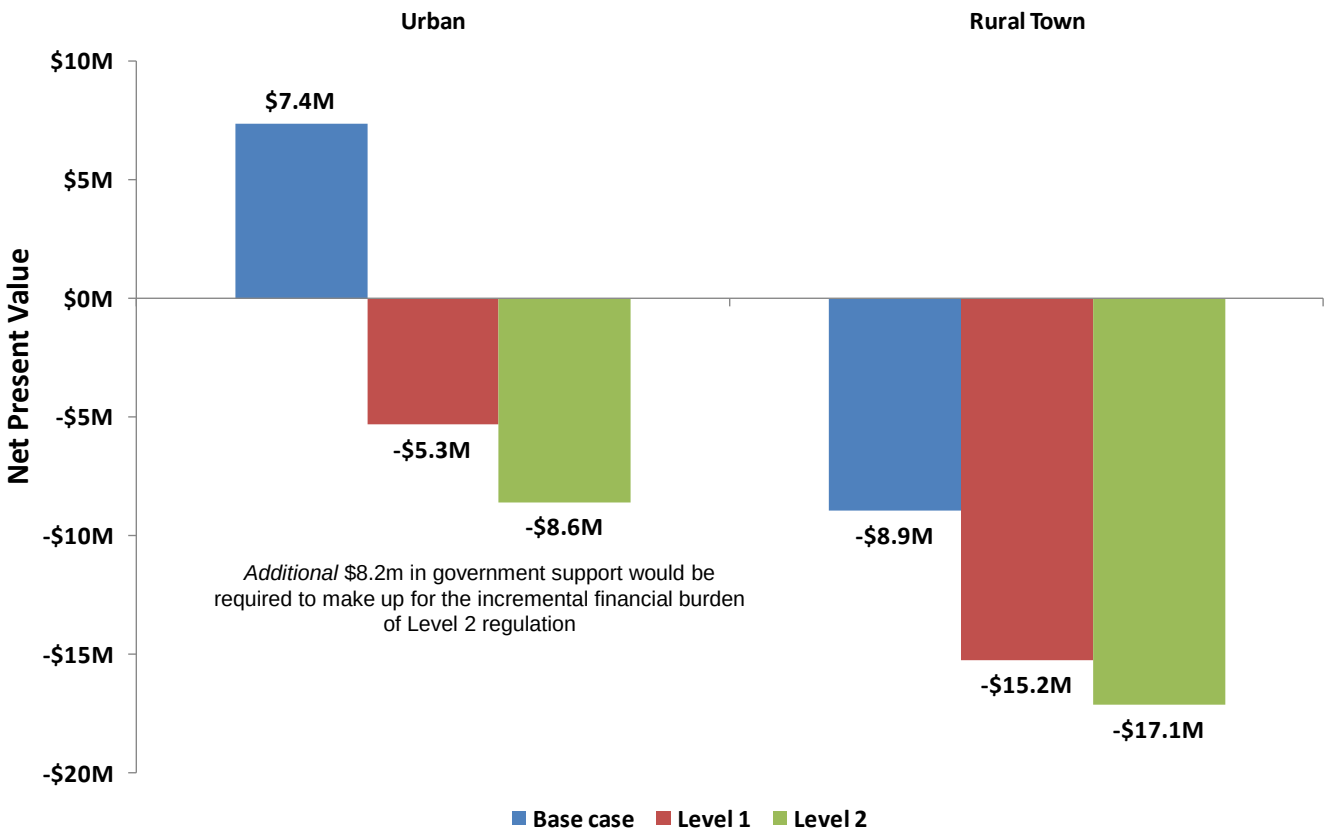
Cumulative FCF: Rural Town Case



	Cumulative FCF
Base case	-$9.3M
With Level 1 regulation	-$16.3M
With Level 1 and 2 regulation	-$18.5M

Introducing Level 1 regulation causes the urban case to be financially unviable without government subsidies

Impact of Regulation on Net Present Value



Comments

Urban

- The combined effect of higher operating expenses and lower revenue from forced resale associated with Level 1 regulation causes NPV to turn negative

Rural Town

- Lower household density necessitates additional CapEx in the form of feeder and distribution fiber and offers fewer subscribers to recoup those costs through additional revenue

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OpEx Impact of Level 1 Regulatory Obligations

Assumption Category	Impacted By	Assumption	Rationale
Customer care	• Formal Complaint Process (Section 208) • CPNI (Section 222)	• New customer complaints procedure results in 5% increase in customer care costs	• CSMG assumption
SG&A costs	• "Just and reasonable" rates, terms, conditions could open door to case by case analysis of practices (Section 201) • USF contribution will require additional administrative support (Section 254)	• New accounting and administrative procedures results in 5% increase in miscellaneous SG&A costs	• CSMG assumption
USF contribution and support	• USF contribution of $1.40 per month applied to broadband customers (Section 254) • USF support calculated for the rural case in both cable and FTTH (Section 254)	• USF contribution of $1.40 per month applied to broadband customers	• Calculated based on size of fund staying constant but revenue generating units increasing. Source: FCC, USAC, IDC

Revenue Impact of Level 1 Regulatory Obligations

Assumption Category	Impacted By	Assumption	Rationale
Retail / Wholesale customer mix	• Resale at regulated rates (Sections 201, 202)	• 40% of customer base become resale lines	• CSMG assumption based on international benchmarks (BT and France Telecom)
Resale ARPU	• Resale at regulated rates (Sections 201, 202)	• 91% of retail broadband ARPU	• Assumes that the resold product would be access only, and wholesale subscribers would provision video and telephony services from other providers; margin calculated based on international wholesale data service pricing versus retail pricing

Revenue and OpEx Impact of Level 2 Regulatory Obligations

Assumption Category	Impacted By	Assumption	Rationale
ARPU	• Retail price regulation (Section 201)	• 10% decrease in blended ARPU	• CSMG assumption
Telecoms Relay Service contributions	• Telecommunications Relay Service (Section 225)	• $1.60 per quarter applied to broadband customers	• Calculated based on size of fund staying constant but revenue generating units increasing
Unbundling	• Network unbundling (Section 251)	• Unbundled ARPU is 41% of retail broadband ARPU • After mandating of resale, 40% of customer base are resale customers, and 60% are retail customers	• ARPU based on international wholesale data service pricing versus retail pricing • Customer split CSMG assumption based on international benchmarks

There are other potential regulations that have not been quantified in this study due to the level of uncertainty regarding likely form and impact on broadband service providers

Regulations that have not been explicitly modeled

- Disability Access (sec. 255)
- Public safety obligations (secs. 201,202,706)
- Network Neutrality Requirements (secs. 201,202)
- Physical interconnection (secs. 201, 202)
- Truth in Billing (secs. 201, 258)
- Entry / Discontinuance / Transfer of Control Limitations (sec. 214)
- Tariffing (sec. 203)
- Accounting Mandates (sec. 220,221)
- State regulation (sec. 152(b), 253)

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